NEW SPECIES OF THE AMPHIPOD CRUSTACEAN GENERA *PHOTIS* AND *GAMMAROPSIS* (COROPHIOIDEA: ISAEIDAE) FROM CALIFORNIA.

by Kathleen E. Conlan[1]

ABSTRACT

Three new species of the amphipod superfamily Corophioidea have been found at depths of 92 to 2005 meters off the Pacific coast of California. *Photis (Photis) typhlops*, new species, *Photis (Photis) linearmanus*, new species, and *Gammaropsis (Podoceropsis) ocellata*, new species, are here described and illustrated, and their morphological relationships with other regional species are discussed.

INTRODUCTION

Three new species of Corophioidea have been found in benthic collections from offshore waters of the coast of California. These are *Photis (Photis) typhlops* , new species, an eyeless form recorded from depths of 812 to 2005 meters, *Photis (Photis) linearmanus*, new species, an eyed taxon from a single collection at a depth of 92 meters, and *Gammaropsis (Podoceropsis) ocellata*, new species, an unusual podoceropsid having faceted but unpigmented eyes, taken at a depth of 590 meters.

The most recent review of regional species of these genera is Conlan (1983). Lists and numbers of regional genera and species can also be found in overview treatments by Austin (1985), Cadien (1991), and Bousfield and Staude (1994). The new species are here described and compared with their local relatives. The present study raises the number of North Pacific species of *Photis (Photis)* to 32, and of *Gammaropsis (Podoceropsis)* to 9.

The corophioidean genera *Photis* and *Gammaropsis* are here assigned to family Isaeidae. Families Isaeidae and Aoridae had been merged within family Corophiidae by Barnard and Karaman (1991). However, continued recognition of the Isaeidae as a distinct corophioidean family is in keeping with the recent work of Myers (1988), and with North Pacific regional comprehensive listings of Ishimaru (1994) and Bousfield and Staude (1994).

ACKNOWLEDGEMENTS

This work was conducted as part of a contract with Science Applications International Corporation for production of a guide to the Corophioidea in the Taxonomic Atlas of the Macroinvertebrate Fauna of the Santa Maria Basin and the Western Santa Barbara Channel. Jim Thomas, Hans Kuck, Joel Martin, Paul Scott, Terry Gosliner, and Judith Price provided specimens and data. C.-t. Shih and E. L. Bousfield reviewed the manuscript. Susan Laurie-Bourque illustrated the three new species fully treated here.

METHODS

The amphipod specimens were part of a large collection of Corophioidea that was examined for preparation of a taxonomic atlas to the benthic invertebrates of the Santa Maria Basin and the western Santa Barbara Channel. Right appendages and mouthparts were illustrated from slide mounts in polyvinyl lactophenol. Body length was measured from the tip of the rostrum to the base of the telson. Material was deposited at the Canadian Museum of Nature (CMN), the California Academy of Sciences (CAS), the Smithsonian Institution, U.S. Museum of Natural History (USNM), the Los Angeles County Museum of Natural History (NHMLAC), and the Santa Barbara Museum of Natural History (SBMNH).

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SYSTEMATICS

Photis (Photis) typhlops, new species
(Fig. 1)

Material examined. TYPE MATERIAL: Holotype: adult male (USNM, catalogue no. 266403), U.S.A.: California: off San Francisco (37° 22.31'N, 123° 19.24'W), station 3-18, 26.829. 9-91, EPA site 102, 1990 m, 15 Sept. 1991, J. A. Blake, collector. Allotype, adult female (USNM, catalogue no. 266404), same location. Paratypes, about 300 individuals (USNM, catalogue no. 266405 (adult males), 266406 (adult females), 266407 (unsexable juveniles)); 6 males, 8 females, 30 juveniles (CAS, catalogue no. CASIZ 085729); 6 males, 8 females, 30 juveniles (NHMLAC, catalogue no. LACM 91-190.1); 6 males, 8 females, 30 juveniles (CMN, catalogue no. NMCC1993-0001), all same location.

OTHER MATERIAL (excluded from the type series): 1 juvenile from U.S.A.: California: off Pt. Buchon (35°15.72'N, 121°04.68'W), 396 m, California Phase II Monitoring Program, Minerals Management Service, Pacific OCS Office, Santa Maria Basin Project, station 020-BSS-01-TX; 2 juveniles from same area, off Pt. San Luis (35°05.07'N, 121°00.75'W), 390 m, station 025-BSR-01-TX; 5 juveniles from same location as preceding, 390 m, station 025-BSR-02-TX; 2 juveniles from same location as preceding, 390 m, station 025-BSR-03-TX; 2 adult females, 4 juveniles from same area, off Purisima Pt. (34°37.80'N, 121°01.66'W), 591 m, 6 Jan. 1984, station 050-BSS-01-TX; 1 adult female, 7 juveniles from same area, off Pt. Arguello (34°33.66'N, 120°56.31'W), 590 m, station 055-BSS-01-TX (all of above SBMNH); 1 juvenile from Eel River Basin (41°56.33'N, 124°38.00'W), 552 m, dissolved oxygen 1.03 ml/l, bottom water temp. 5.86°C, silt-clay sediment, % organic carbon 1.473, 22 Nov. 1987, station SB-4 (NHMLAC); 1 juvenile from same area as preceding (41°39.77'N, 124°29.33'W), 524/549 m, dissolved oxygen 1.6 ml/l, bottom water temp. 5.92°C, sand-silt-clay sediment, % organic carbon 0.859/0.782, 22 Nov. 1987, station SB-12 (NHMLAC); 1 juvenile from same area as preceding (40°57.00'N, 124°23.42'W), 188 m, dissolved oxygen 4.35 ml/l, bottom water temp. 8.67°C, silt-clay sediment, % organic carbon 0.924, 19 Nov. 1987, station SB-14 (NHMLAC); 1 juvenile from same area as preceding (40°57.20'N, 124°33.20'W), 555 m, dissolved oxygen 2.51 ml/l, bottom water temp. 6.56°C, silt-clay sediment, % organic carbon not recorded, 18 Nov. 1987, station SB-16 (NHMLAC) (all Eel River Basin samples collected by MEC Analytical Systems Inc., Carlsbad, California).

Diagnosis. Eye lacking. Antennae half length of the body, with long setae. Coxae 1-5, ventral margins with 0-4 long setae. Gnathopod 1, carpus longer than propodus, propodus slender, palm convex or shallowly excavate. Gnathopod 2 of male, basis with row of stridulation ridges angled across lateral face; palm of propodus transverse, with tooth and long spine at palmar defining corner and two small teeth in palm.

Description. Adult male (3.2 mm) Holotype: Head lobe triangular. Eye lacking. Antennae 1 and 2 about equal in length. Antenna 1 weakly setose, article 3 longer than article 1; accessory flagellum microscopic button. Antenna 2 moderately setose, flagellum not pediform, longer than article 5, distally spinose.

Upper lip, epistome triangular. Mandible with 3-4 raker spines; molar flake present; palp strong, article 3 hardly wider distally than proximally, both articles 2 and 3 with numerous setae, article 2 longer than article 3. Maxilla 1, inner plate without setae; palp narrower than outer plate. Maxilla 2, inner plate about same width as outer, with facial setae. Maxilliped, inner plate not reaching end of article 4; outer plate not reaching end of article 5; unguis (article 8) about equal in length to article 7.

Peraeopods 1-5, ventral margins of coxae with 0-2 long setae each. Gnathopod 1, coxa more anterodistally produced than coxa 2; basis inserted mid-proximally on inner face, not densely setose; carpus about equal in length to propodus, anterior margin distally setose; propodus, palm shallowly excavate, defined by single spine; dactyl longer than palm of propodus, posterior (inner) margin with few short setae and cusps. Gnathopod 2, basis, lateral face with row of stridulation ridges; carpus shorter than propodus; propodus, width 1.5 times width of propodus of gnathopod 1, palm transverse, with 2 excavations and tooth and spine at defining corner, setae at dactyl hinge less than half length of propodus; dactyl overlapping palm by length of unguis, without tooth, with spine and setal cluster proximal of unguis.

Peraeopod 3, coxa with row of stridulation ridges on ventral margin. Peraeopod 4, coxa, posterior margin not excavate. Peraeopods 3 and 4, basis not expanded, merus wider than carpus and produced anteriorly over less than 1/4 of carpus; dactyl shorter than propodus. Peraeopod 5, coxa similar in depth to coxa 4; basis broad, not posteriorly excavate; merus not posteriorly excavate; merus and carpus not spinose; propodus with only single long spine at anterodistal corner; dactyl with 2 pronounced cusps at junction of unguis. Peraeopods 6 and 7, coxae smaller than coxa 5; otherwise articles similar in shape to peraeopod 5, although bases narrower and dactyl not cusped.

Pleon plates 1-3 not posterodistally notched. Pleon and urosome without dorsally erect setae or cusps. Uropod 1, peduncle without lateral ecdysial spine proximally or tooth-like process extending ventrally below rami; rami tipped by 1-2 short spines. Uropod 3, peduncle not spinose; outer ramus nearly as long as peduncle and tipped by 1-2 long setae, inner ramus about 1/4 length of outer, tipped by single short spine. Telson apices marked by single long seta and small knob.

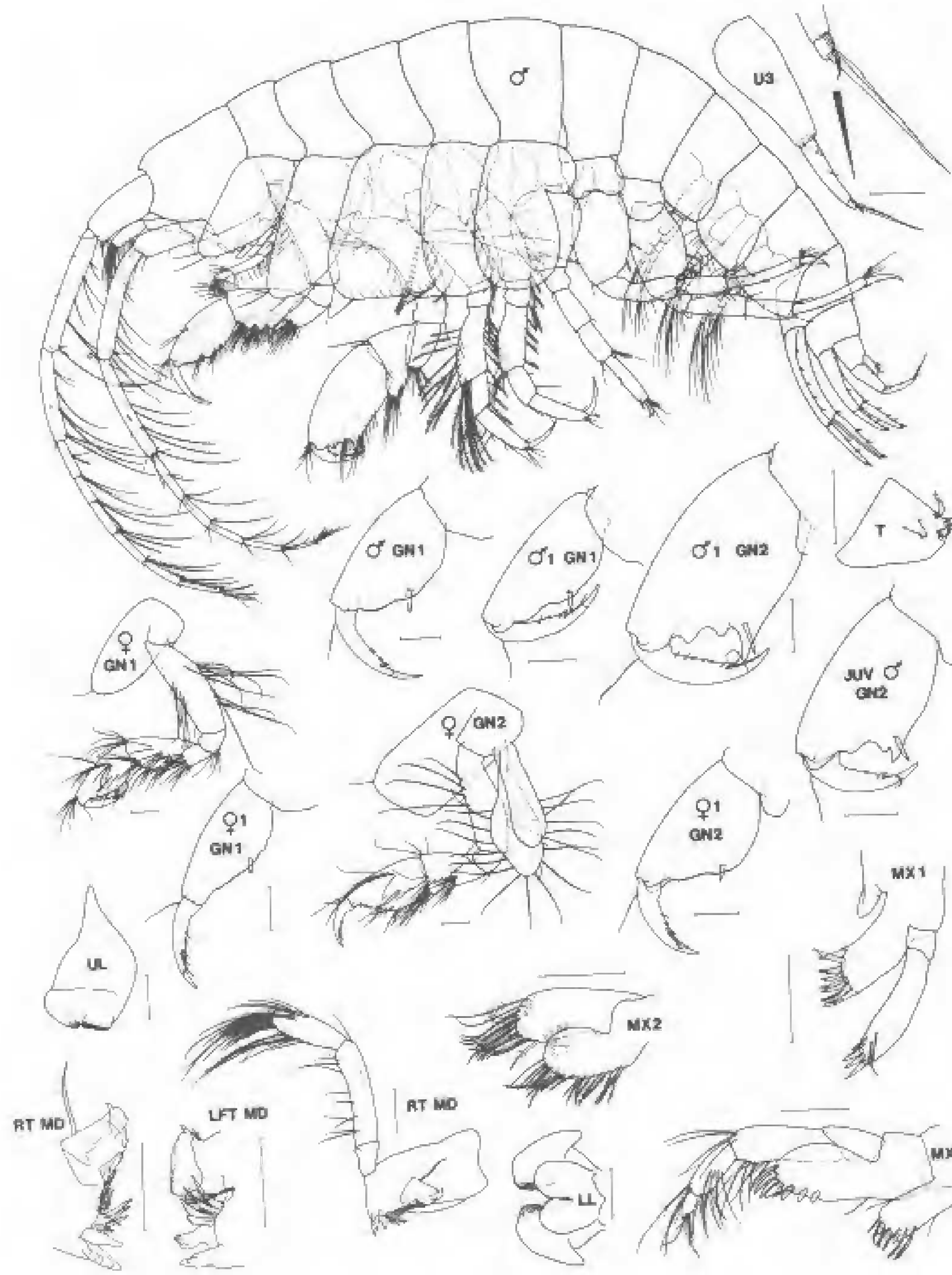

FIG. 1. ***Photis typhlops*,** new species. Adult male, (3.2 mm) HOLOTYPE: whole body, distal articles of gnathopods 1 and 2 (setae omitted), mouthparts, uropod 3, and telson. Adult male 1 (3.4 mm) PARATYPE: distal articles of gnathopods 1 and 2 (setae omitted). Juvenile male (2.9 mm): distal articles of gnathopod 2 (setae omitted). Adult female br. III. (3.4 mm) ALLOTYPE: gnathopods 1 and 2. Adult female 1 br. III. (3.3 mm) PARATYPE: gnathopods 1 and 2, magnifications (setae omitted). Lateral views: whole body, maxilla 1, uropod 3, and telson; other views medial. Scale 0.1 mm.

Condition. With all appendages. Right appendages, mouthparts, and telson slide mounted.

Adult female. Body length 3.4 mm. Gnathopod 1, carpus and propodus similar to but slightly slenderer than in male. Gnathopod 2, basis without stridulation ridges; propodus, palm convex. Brood plates moderately wide, setae without hook at each tip. Other features as in male.

Condition. With all appendages. Right appendages, mouthparts, and telson slide mounted.

Variation. The narrowness and amount of indentation of the propodus of gnathopod 1 of the male varies, becoming narrower and more excavate in larger males. Tooth length in the palm of gnathopod 2 is also greater in larger animals. The number of long setae on the ventral margin of coxae 1-5 may be as much as 4. Immature females bear asetose brood plates or lack them altogether.

Etymology. From the Greek *typhlops*, meaning blind, alluding to the absence of pigmented eyes in this species.

Distribution and ecology. Collected from 188-2005 m off Santa Barbara, San Francisco, and Eureka-Crescent City. In the San Francisco collections, *Photis typhlops* was found from 812 m to 2005 m depth, with density peaking at 9500 individuals/m^2 at 1770 to 1990 m depth. At this density the amphipods were clearly visible as a thick mat concentrated at the sediment surface. This is the first known record of a deep water amphipod mat (J. A. Blake, pers. comm., 7 Dec. 1992). Evidently *Photis typhlops* can occur in areas of low dissolved oxygen, judging from the Eureka-Crescent City collections.

Taxonomic Commentary. Two other blind species of *Photis* are known to occur in the North Pacific: *Photis (Photis) kurilica* Gurjanova and *Photis (Cedrophotis) malinalco* J. L. Barnard. *Photis kurilica* differs from *P. typhlops* in the following respects: head lobe rounded ventrally; antenna 1, flagellum 8 articles, slightly longer than peduncle; antenna 2, peduncle article 4 3 times as long as article 3; gnathopod 1 of male, basis, anterior and posterior margins covered with abundant plumose setae, carpus equal in length to propodus, propodus, palm concave; gnathopod 2 of male, coxa with 9 long setae on ventral margin, basis with abundant short, stout setae anteriorly and long, slender setae posteriorly, propodus, palm concave, without tooth; gnathopod 2 of female, propodus, palm shallowly concave; uropod 1 with 8-11 lateral spines on peduncle and rami; uropod 2 with 2-12 lateral spines on peduncle and rami. *Photis kurilica* has only been recorded from the east coast of Russia (Gurjanova, 1955).

Photis malinalco, from the Cedros Trench, Baja California, has a much longer inner ramus on the third uropod (half the length of the outer - a defining character of the subgenus), more slender propodus of gnathopods 1 and 2, broader coxa 1, and less spinose uropods 1 and 2 (J. L. Barnard, 1967).

Another blind species of *Photis* is the South Atlantic abyssal *Photis coeca* J. L. Barnard. This species differs from *P. typhlops* as follows: antenna 1, article 3 only slightly longer than article 1; gnathopod 1 of female, coxa square, basis with 3 long setae anteriorly and 1 posteriorly; gnathopod 2 of female, coxa square, propodus much narrower than wide; peraeopod 3, coxa covering only 1/3 of basis; peraeopod 5, basis, width 3/4 of length; uropod 1 rami, outer ramus with 1 spine, inner ramus with 0 (J. L. Barnard, 1962).

All four blind species of *Photis* possess distinctly longer antennae than in eyed species of *Photis*, a characteristic which apparently correlates with lack of visual sensory organs.

Photis (Photis) linearmanus, new species
(Fig. 2)

Material examined. TYPE MATERIAL: Holotype: adult male (USNM, catalogue no. 239498), U.S.A.: California: off Purisima Point (34°43.0'N, 120°47.4'W), 92 m, May 1987, California Phase II Monitoring Program, Minerals Management Service, Pacific OCS Office, Santa Maria Basin Project, cruise 1-3, station R-4, replicate 1, Battelle, collector.

Diagnosis. Eyes small, pigmented. Coxae 1-5, ventral margins with 2-11 long setae. Gnathopod 1, carpus shorter than propodus; propodus broad; palm strongly excavate in male. Gnathopod 2 of male, basis with few stridulation ridges on anterodistal margin; palm of propodus oblique, linear, defining corner not marked by spine or change of angle, with 2 small teeth in palm.

Description. Adult male (3.4 mm) Holotype: Head lobe triangular. Eye black, oval.

Upper lip, epistome triangular. Mandible with 3 raker spines; molar flake present; palp strong, article 3 hardly wider distally than proximally, both articles 2 and 3 with numerous setae, article 2 longer than article 3. Maxilla 1, inner plate without setae; palp narrower than outer plate. Maxilla 2, inner plate about same width as outer, with facial setae. Maxilliped, inner plate not reaching end of article 4; outer plate not reaching end of article 5; unguis (article 8) about equal in length to article 7.

Peraeopods 1-4, ventral margin of coxa 2 with 11 long setae; coxae 1, 3, and 4 with 2-5 setae. Gnathopod 1, coxa different in shape from coxa 2, narrowed distally; basis inserted midway on inner face, not densely setose; carpus shorter than propodus, anterior margin setose only at anterior junction with propodus; propodus, palm concave, defined by single small spine; dactyl only as long as palm of propodus, posterior (inner) margin with few short setae and cusps. Gnathopod 2, basis, anterodistal margin with few stridulation ridges; carpus shorter than propodus; propodus, width

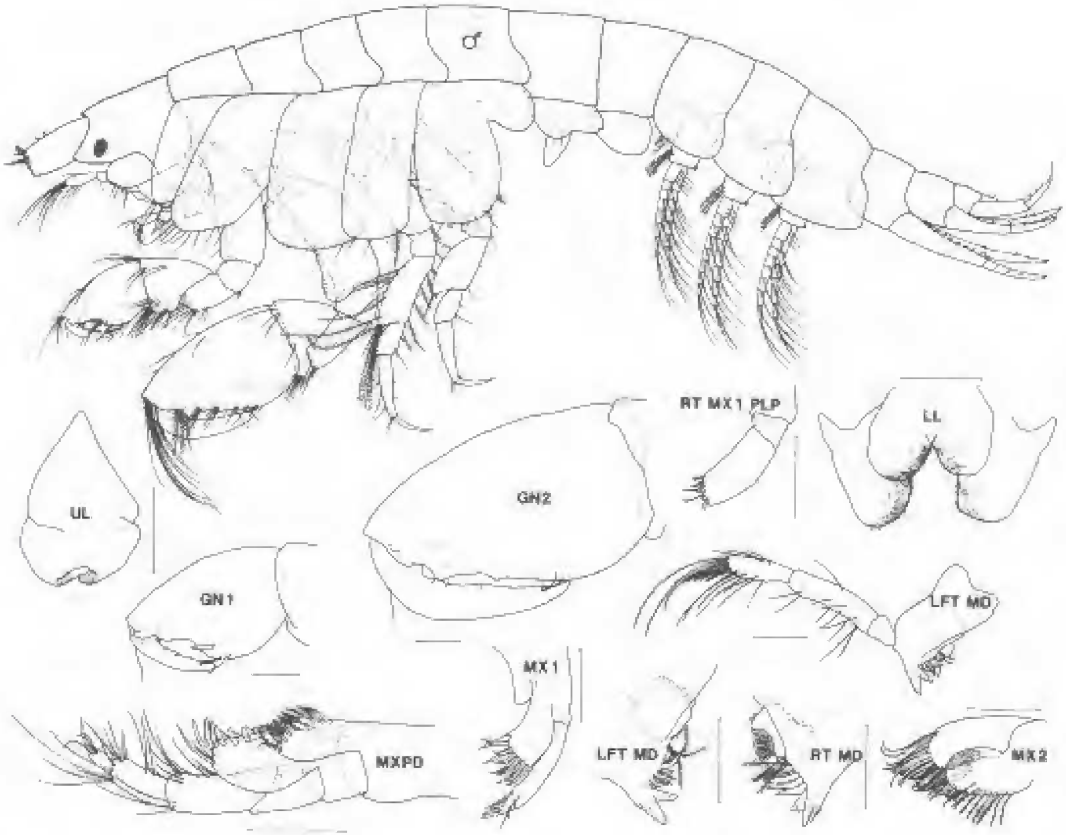

FIG. 2. ***Photis linearmanus***, new species. Adult male (3.4 mm) HOLOTYPE. Lateral views: whole body, mandibles, and maxilla 1; other views medial. Scale 0.1 mm.

1.7 times width of propodus of gnathopod 1, palm oblique, with shelf at dactyl and shallow protuberance midway, setae at dactyl hinge nearly as long as propodus; dactyl scarcely overlapping palm, inner margin evenly curved, with spine and setal cluster proximal of unguis.

Peraeopod 3, coxa with row of stridulation ridges on ventral margin. Peraeopod 4, coxa, posterior margin not excavate. Peraeopods 3 and 4, basis not expanded; merus wider than carpus and produced anteriorly over about 1/4 of carpus; dactyl shorter than propodus. Peraeopod 5, coxa similar in depth to coxa 4. Peraeopods 6 and 7, coxae smaller than coxa 5; other articles of peraeopods 5-7 lacking.

Pleon plates 1-3 not posterodistally notched. Pleon and urosome without dorsally erect setae or cusps. Uropod 1, peduncle without lateral ecdysial spine proximally or tooth-like process extending ventrally below rami; rami tipped by 1 short spine. Uropod 3, peduncle with single spine ventrally at origin of rami; outer ramus 2/3 length of peduncle and tipped by 1 long seta; inner ramus about 1/4 length of outer ramus, tipped by single short spine. Telson apices marked by single long seta and small knob.

Condition. Without antennae, right peraeopods 4-7, and left peraeopods 5-7.

Adult female. Unknown.

Etymology. From the Latin, *linearis*, meaning linear, and *manus*, meaning hand, referring to the oblique, nearly linear palm of the propod of gnathopod 2 of the mature male.

Distribution. Known only from thissingle collection in Santa Maria Basin, at 92 m in depth.

Taxonomic Commentary. This is the only species on the northeastern Pacific coast whose adult male has an oblique palm on the propodus of the second gnathopod. The relative sparsity of setae on the ventral margins of the coxae, the cluster of long setae at the origin of the dactyl on the male's gnathopod 2, and the concave palm of the male's gnathopod 1 are also distinctive, although not unique among regional species.

Gammaropsis (Podoceropsis) ocellata, new species
(Fig. 3)

Material examined. TYPE MATERIAL: Holotype: adult male (USNM, catalogue no. 239495), U.S.A.: California: off Pt. Arguello (34°33.66'N, 120°56.31'W), 590 m, 5 January 1984, California Phase II Monitoring Program, Minerals Management Service, Pacific OCS Office, Santa Maria Basin Project, station 055, BSS-01-TX, MBC Applied Environmental Sciences, collector. Allotype, adult female (USNM, catalogue no. 239496), same location. Paratypes: 1 adult female, 3 juveniles (USNM, catalogue no. 239497); 2 adult females, 2 juveniles (NHMLAC, catalogue no. LACM 84-285.1); 2 adult females, 2 juveniles (SBMNH, catalogue no. 35646); 2 adult females, 2 juveniles (CMN, catalogue no. NMCC1993-003), all from the same location.

Diagnosis. Eyes weakly faceted, unpigmented. Antennae, setae maximally as long as last peduncular article. Uropod 1, peduncular ventral spinous process less than half length of shortest ramus. Gnathopod 2 of male, propodus, palm nearly transverse, centrally notched, and defined by 1 spine and change in angle; dactyl not longer than palm. Peraeopod 5 of male, basis shallowly excavate on posterior margin. Gnathopod 2 of female, propodus, palm shallowly excavate.

Description. Adult male (3.8 mm) Holotype: Head lobe triangular, but not anteriorly acute. Eye oval, with about 12 unpigmented facets. Antennae 1 and 2 equal in length. Antenna 1 moderately setose with long setae posteriorly, article 3 longer than article 1; accessory flagellum microscopic button. Antenna 2 moderately setose, with long setae also, flagellum not pediform, longer than article 5, distally spinose.

Upper lip, epistome acutely produced. Mandible with 5 raker spines; molar flake present; palp strong, article 3 hardly wider distally than proximally, both articles 2 and 3 with numerous setae, article 2 longer than article 3. Maxilla 1, inner plate with single long seta; palp somewhat narrower than outer plate. Maxilla 2, inner plate nearly as wide as outer, with row of facial setae. Maxilliped, inner plate nearly reaching end of article 4; outer plate not reaching end of article 5; unguis (article 8) as long as article 7.

Peraeopods 1-4, coxae, ventral margins with minute setae only. Gnathopod 1, coxa similar in shape to and not shallower than coxa 2; basis inserted mid-distally on inner face, not setose anterodistally; carpus longer than propodus, with anterodistal cluster of setae; propodus nearly simple, palm indistinct, defined by single long spine; dactyl much longer than palm of propodus, posterior (inner) margin with several short setae and cusps. Gnathopod 2, basis without stridulation ridges; carpus shorter than propodus; propodus, width 2.5 times width of propodus of gnathopod 1, palm nearly transverse, with protuberance near origin of dactyl followed by oval incision, spine at palmar corner, setae at dactyl hinge about 1/2 length of propodus; dactyl not toothed, only as long as palm.

Peraeopod 3, coxa without stridulation ridges on ventral margin. Peraeopod 4, coxa, posterior margin not excavate. Peraeopods 3 and 4 basis not expanded, merus wider than but hardly produced over carpus; dactyl not elongate, much shorter than propodus. Peraeopod 5, coxa as deep as coxa 4; basis moderately broad, shallowly posteriorly excavate in adult male; merus shallowly concave posteriorly; carpus with cluster of spines at posterior junction of propodus; propodus with few spines along anterior margin; dactyl not cusped. Peraeopod 7, coxa not expanded. Peraeopods 6 and 7 similar in shape to peraeopod 5, although bases narrower.

Pleon plates 1-3 with few minute setae posterodistally but without cusps or ridges. Urosome segments 1 and 2 with pair of dorsally erect setae but without cusps. Uropod 1, peduncle without lateral ecdysial spines, but with spinous process extending ventrally below rami about 1/3 length of outer ramus; rami tipped by 2-3 spines. Uropod 3, peduncle spinose dorsally at origin of rami; outer ramus nearly as long as peduncle and tipped by 1-2 long setae, inner ramus as long as outer, tipped by 1 spine. Telson apices marked by nipple and setal cluster.

Condition. Without peraeopods 5-7.

Adult female ov. (4.4 mm) Allotype: Gnathopod 2, propodus, palm shallowly excavate. Brood plates moderately wide, setae with hook at each tip. Other features as in male.

Condition. Without right peraeopods 4,5, and 7, and left peraeopods 6 and 7.

Etymology. From the Latin *ocellata*, referring to the relatively small unpigmented eyes of this species.

Distribution. Known only from this single location in the Santa Maria Basin, at 590 m in depth.

Taxonomic Commentary. The faceted but unpigmented eye distinguishes *Gammaropsis ocellata* from other members of the subgenus on the North American Pacific coast. Another deepwater species, *Gammaropsis (Podoceropsis) kermadeci* Stebbing, also lacks pigmented eyes, but differs considerably from *G. ocellata* in having a much broader propodus of gnathopods 1 and 2, a more enlarged and transverse palm on the propodus of the male gnathopod 2, and a longer carpus relative to the merus on peraeopods 3 and 4. The body is also dorsally setose, which is not the case in *G. ocellata*. *Gammaropsis ocellata* most closely resembles *G. (P). barnardi* Kudryashov and Tzvetkova, which has been described from southern and western Sakhalin, Russia (50°N, 145°W) and Vancouver Island, British Columbia (48°48'N, 125°12.5'W) (Kudryashov and Tzvetkova, 1975; Conlan, 1983). *Gammaropsis ocellata* differs from *G. barnardi* in having an unpigmented eye, more transverse

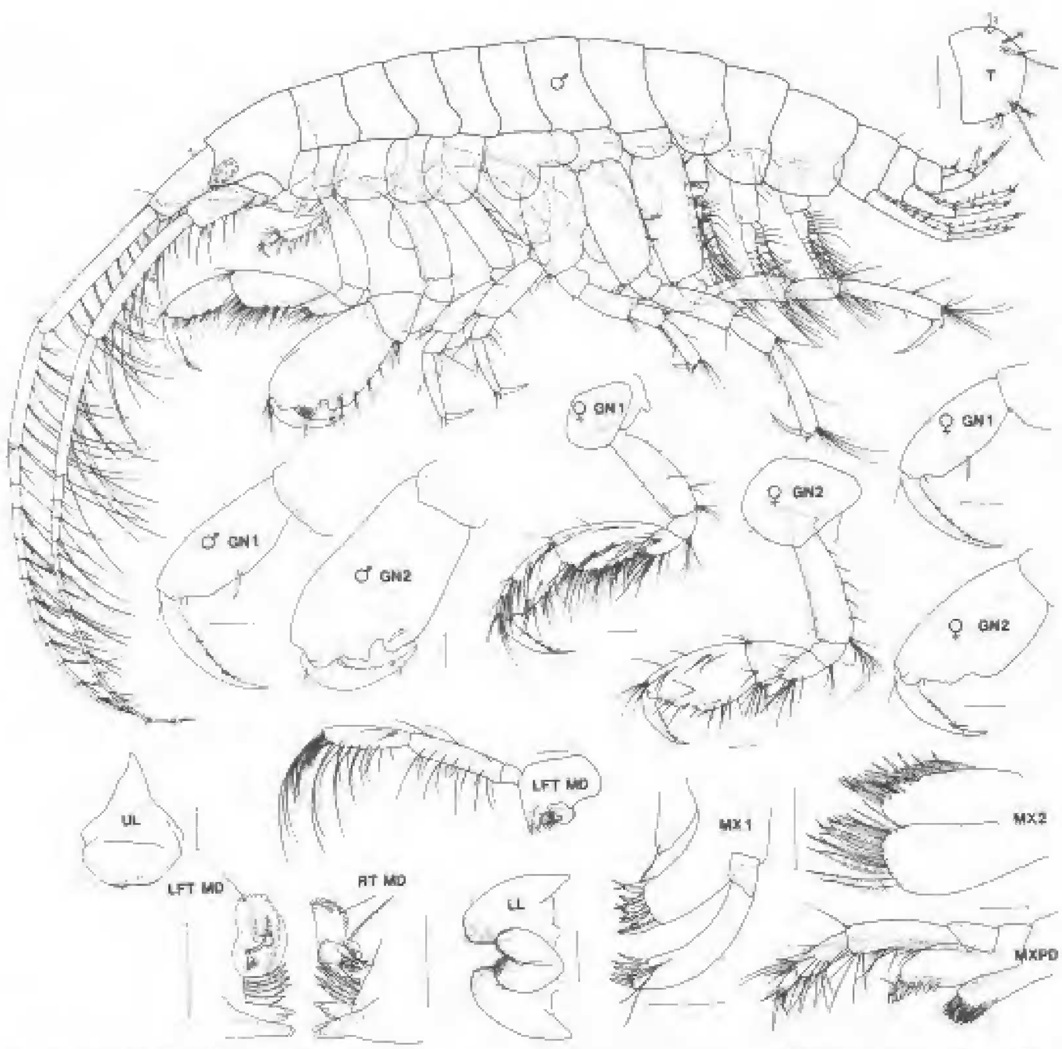

FIG. 3. ***Gammaropsis ocellata***, new species. Adult male (3.8 mm) HOLOTYPE: whole body, distal articles of gnathopods 1 and 2 (setae omitted), mouthparts, and telson; Adult female (4.4 mm) ALLOTYPE: gnathopods 1 and 2. Lateral views: whole body, mandibles, and maxilla 1; other views medial. Scale 0.1 mm.

palm of gnathopod 2 in the male, more concave palm of gnathopod 2 in the female, and less excavate peraeopod 5 basis in the male.

DISCUSSION

Photis typhlops and *G. ocellata* demonstrate the tendency of deepwater or cavernicolous amphipods to lose eye pigmentation and/or facets and lengthen their antennae. Since no phyletic treatment has been developed for either genus, it cannot be determined whether these species bear other apomorphic features. *Photis typhlops* and *P. linearmanus* belong to the poorly setose group of photids which lack a dense fringe of setae on the ventral margin of the coxae. Males of both species are stridulators and the second gnathopods are moderately sexually dimorphic. Stridulation is the norm for photids, and is presumably of value for communicating mating intent, particularly in the close community contact that was found for *Photis typhlops*. *Gammaropsis ocellata* shows the same sort of sexual traits as other members of the subgenus. The subgenus is very conservative in its range of sexual dimorphism. *Gammaropsis ocellata* shows less exaggerated alteration of the second gnathopod and fifth peraeopod than in some other species, suggesting that the specimen described here may not have reached fully mature size. However the loss of eye pigmentation is significant and unique in the genus.

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LEGEND FOR FIGURES

GN - gnathopod; JV - juvenile; LL - lower lip; LFT - left; MD - mandible; MX - maxilla; MXPD - maxilliped; PLP - palp; RT - right; T - telson; UL - upper lip; U - uropod.

Vol I, No. 2. ERRATA OF SUBJECT MATTER

Editorial.

p. 1. The correct address for Roy J. Kropp is: Battelle Ocean Sciences, Duxbury, MA 02332 USA.

Paper No. 1: Pleustinae

p. 42 *et sequ.* Apologies are extended to readers who may have encountered difficulties in connecting labels with figures.

Paper No. 2: Phoxocephalidae.

p. 83. The tribute to Dr. Arthur May should read: "The species *Mandibulophoxus mayi* Jarrett & Bousfield, 1994, is named in honour of Dr. Arthur W. May, President and Vice-Chancellor of Memorial University, St. John's, Newfoundland, and former President, Natural Sciences and Engineering Research Council of Canada".

p. 77 *et sequ.* Apologies are extended for the heavy overprinting of the plates, esp. figs. 8, 17, 28, 29.

p. 102, *et sequ.* Berkeley Sd. - corrected to Barkley Sd.

p. 120, Fig. 27. Reversed curved line on peraeon segment 2 should be removed.

p. 125. Add to the bottom of the page:
"*H. videns* is similar to *H. conlanae* and *H. ellisi* ".

p. 147. All references following Austin, W. C., and before Barnard, K. H., are attributable to Barnard, J. L.